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Microbial Quality and Safety of Pesto, Salsa, Guacamole and Tapenades at Retail Markets

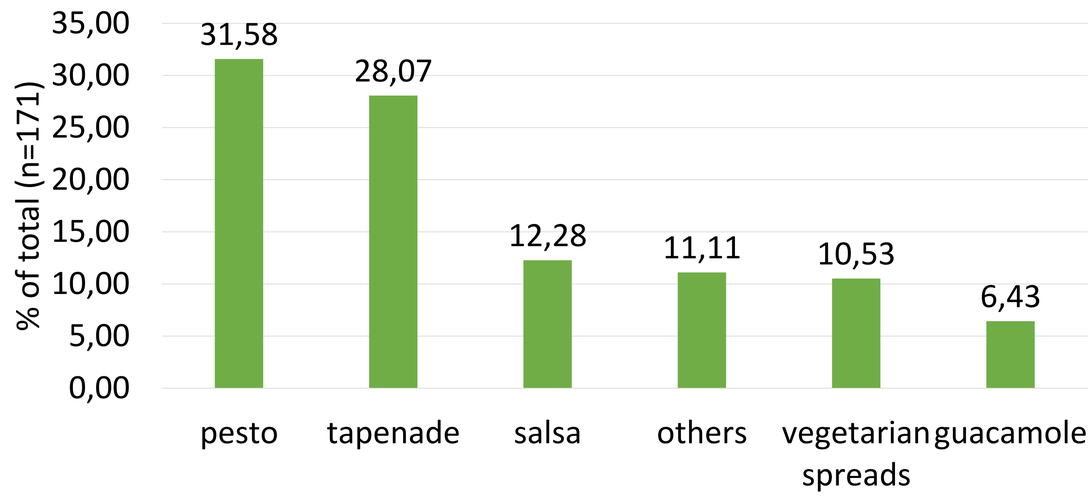
PURPOSE AND OBJECTIVE

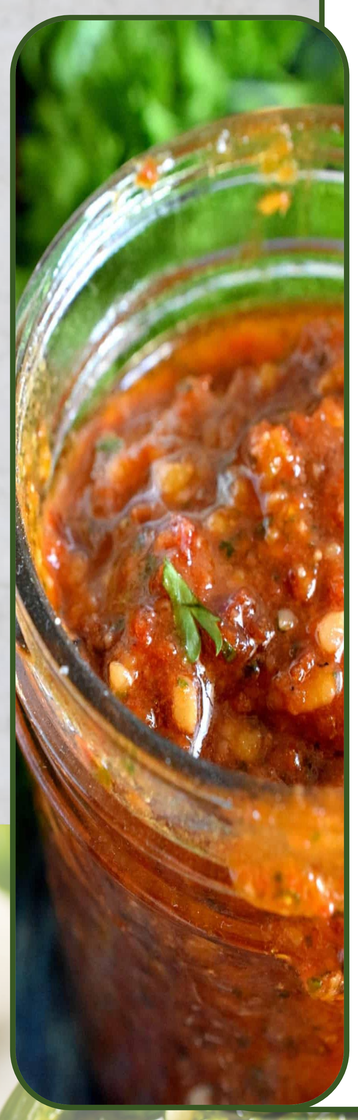
- Due to attention to a more sustainable diet with foods of non-animal origin, a wide variety of vegetarian dips are being introduced on the retail market.
- Vegetarian spreads and dips with a vegetable or herb as base component are the focus in this research, like pesto, tapenades, salsa and guacamole.
- The first objective was to collect information on the scope of the vegetarian spreads and dips with a vegetable or herb as base component that are available on the Flemish retail market (with all the stores situated near Ghent – Belgium - Europe).
- The second goal was to evaluate the microbiological quality and safety of the current products.
- Finally, appropriate microbiological guidelines for quality, hygiene and safety were developed based on empirical research and knowledge.

METHODS

- Local supermarkets were visited to establish the type of vegetarian dips available at retail and information on storage conditions & ingredients were collected.
- Ca. 40 refrigerated and 8 ambient-stable products were subjected to microbial analyses both at time of purchase and (enforced) end of shelf life for both overall quality and hygiene indicators and safety indicators.
- Also pH, a_w and gas composition was measured.
- Furthermore challenge testing was conducted to evaluate the growth potential of *Listeria monocytogenes*, *Salmonella* spp. and *Bacillus cereus* in the vegetarian spreads with a vegetable or herb base.
- Finally a company visit was planned to see a production process in action and a microbiological evaluation was conducted to point out the most critical steps in the production process.

Box 1: The relative amount (y-axis) of different vegetarian spreads and dips (x-axis) found on the Belgian market. The total of products found during the period 2/07/2018-5/08/2018 in markets situated near Ghent.





RESULTS

Market and product screening

- In total 171 different food items were found, mainly pesto's (31,6 %), often tomato based (39,8%) an contained in 55,0% an oil base (see box 1)
- In total 74,2% of the product items containing an additive contained an organic acid preservative which was the main found group of preservatives.
- The pH varied between 3.6-5.2, the a_w varied between 0.91-0.99.

Microbiological screening

- No *Listeria monocytogenes* counts of <10 cfu/g were noted.
- In the refrigerated products *Bacillus cereus,* sulphite reducing *Clostridia, E. coli* and coliforms were occasionally found but never exceeded 3.65 log cfu/g, aerobic psychotropic count and psychotropic lactic acid bacteria ranged between <2–9.44 log cfu/g and yeast and fungi ranged between <1.0–6.67 log cfu/g.
- The commercial stability was confirmed for the ambient-stable products.
- No growth potential of the investigated pathogens was observed during the challenge testing.

Process evaluation

- The most critical step during the production process was the High Pressure Processing (HPP)-step because this was the only intervention measure that could eliminate possible pathogens present.
- No post-contamination was possible in the production process under consideration.

Box 2: Proposed microbiological guidelines for the vegetarian spreads and dips with a vegetable or herb as base component

Parameter	Target value (cfu/g)	Tolerance value (cfu/g)	End of shelf life ("best before"/"use by") (cfu/g)
Psychotrophic plate count	For acidified products, these parameters are variable. If these parameters are used as hygiene indicators then the food business operator must set up its own target values trough baseline studies.		
Psychotropic lactic acid bacetria	1×10^4	1×10^5	1×10^8
Yeast	1×10^4	1×10^5	1×10^6
Fungi	3×10^2	3×10^3	No visual growth
Enterobacteriaceae	3×10^2	3×10^3	n.a.
E. coli	< 10	< 50	< 50
Sulphite reducing *Clostridia*	3×10^2	3×10^3	3×10^5
Presumptive *Bacillus cereus*	3×10^2	3×10^3	3×10^3
***Salmonella* spp.**	Absence on 25 grams		
Listeria monocytogenes	Absence on 25 grams	Absence on x grams or < 100	100

SIGNIFICANCE

- Based on this work, microbiological guidelines were proposed (see box 2).
- The proposed values indicate a necessity of this food processing industry to validate their production process and verify the quality of raw material because currently quite a number of products exceeded the proposed values, surely for spoilage causing bacteria
- We learned that this product group is using a wide range of raw materials and hurdle technologies to prolonge the shelf life

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